

Topics in Automated Deduction (CS 576)

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Isar

- Proof scripting language
- Machine readable
- Also human readable
- Supports structured proofs
- Designed to hide enough detail to increase ease of reuse

Apply scripts

- Unreadable
 - Needs to be interleaved with computer response
- Hard to maintain
 - Often contain very specific details that change when the theorem changes moderately
- Lacks structure
 - Can't tell where one subgoal ends and the next begins

Apply versus Isar Scripts

Apply script = assembly language program

Isar proof = structures program with comments

Apply useful for proof exploration

Isar script useful for final proof documentation

Typical Isar Proof

```
proof
  assume formula0
  have formula1 by simp
  ⋮
  have formulan by blast
  show formulan+1 by ...
qed
formula0  $\implies$  formulan+1
```

proves

Isar Core Syntax

proof = **proof** (-|[*method*]) *statement** **qed**
| **by** *method*

method = (**simp**...) | (**blast**...) | (**rule**...) | ...

statement = **fix** *variables* (\wedge)
| **assume** *props*
| [(**from** *fact**)] (**show**|**have**) *props* *proof*

prop = [(*label*:)] *string*

fact = *label*